

What is Claimed is:

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1. A method for converting direct current (DC) electrical voltage from a DC power source to an alternating current (AC) voltage, comprising:
 - controlling DC power from the DC power source, wherein the DC power source provides varying DC voltage;
 - drawing DC power from a battery based on DC power available from the DC power source;
 - maintaining a substantially constant DC voltage on a DC bus; and
 - inverting the DC voltage from the DC bus to the AC voltage.
2. The method of claim 1, further comprising providing the AC voltage to a load.
3. The method of claim 2, wherein the controlling of DC power from the DC power source is a function of power required by the load.
4. The method of claim 2, further comprising electrically isolating the fuel cell from the load.
5. The method of claim 1, wherein the drawing of the DC power from the battery is uncontrolled.

6. The method of claim 1, wherein the drawing of DC power from the battery is controlled.

7. The method of claim 1, wherein the controlling of the DC power from the DC power source comprises boosting the DC voltage from the DC power source.

8. The method of claim 1, wherein the DC power source is a fuel cell.

9. The method of claim 1, further comprising preventing current from flowing to the DC power source.

10. A method for converting direct current (DC) electrical voltage from a DC power source to an alternating current (AC) voltage, comprising:
controlling DC power from the DC power source, wherein the DC power source provides varying DC voltage;
providing DC power to a battery based on DC power available from the DC power source;
maintaining a substantially constant DC voltage on a DC bus; and
inverting the DC voltage from the DC bus to the AC voltage.

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11. The method of claim 10, wherein the providing of DC power to the battery comprises providing a charging current to the battery.

12. The method of claim 10, wherein the drawing of the DC power from the battery is uncontrolled.

13. The method of claim 10, wherein the drawing of DC power from the battery is controlled.

14. The method of claim 10, wherein the DC power source is a fuel cell.

15. A system for converting DC electrical voltage from a DC power source to an AC voltage, wherein the DC power source provides varying DC voltage, the system comprising:

a DC-to-AC inverter;
a DC bus coupled to the DC-to-AC inverter;
a converter coupled to the DC bus and to the DC power source that maintains a substantially constant voltage on the DC bus by regulating power from the DC power source;
a battery; and

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a device coupled to the battery and to the converter, wherein the device controls the flow of current to and from the battery.

16. The system of claim 15, wherein the device comprises a controllable semiconductor.
17. The system of claim 15, wherein the controllable semiconductor is a MOSFET.
18. The system of claim 17, wherein the MOSFET is coupled in anti-parallel with a diode.
19. The system of claim 18, wherein the diode is a body diode of the MOSFET.
20. The system of claim 18, wherein the diode is a Schottky diode.
21. The system of claim 17, wherein the MOSFET is operated in its active region to maintain a constant float voltage across the battery.
22. The system of claim 15, wherein the device comprises a noncontrollable semiconductor.
23. The system of claim 22, wherein the noncontrollable semiconductor is a diode.

24. The system of claim 15, wherein the converter operates to increase voltage.
25. The system of claim 15, wherein the converter is a boost converter.
26. The system of claim 15, further comprising an isolation device coupled to the DC-to-AC inverter.
27. The system of claim 26, wherein the isolation device is an electrical transformer.
28. The system of claim 15, further comprising a current protection device coupled to the DC bus and designed to prevent current from being applied to the DC power source.
29. The system of claim 28, wherein the converter reduces the current in the current protection device to a level below the level of current drawn by the power source.
30. The system of claim 15, further comprising an input filter coupled to the DC power source and to the converter.
31. The system of claim 15, wherein the DC-to-AC inverter comprises an H-bridge inverter.

32. The system of claim 15, wherein the DC-to-AC inverter is designed to operate with a low voltage input.

33. The system of claim 15, wherein when an increase in load demand occurs, the converter draws power from the battery equal to the increased demand until the DC power source is able to support the increased load demand.

34. The system of claim 15, wherein the converter regulates power drawn from the battery and the DC power source during load transients.

35. The system of claim 15, wherein the converter draws power from the battery when load demands exceed a capacity of the DC power source.

36. The system of claim 15, wherein the converter operates to maintain a substantially constant voltage on the DC bus.

37. The system of claim 15, further comprising an electrical power grid coupled to the controller.

38. The system of claim 15, wherein the DC power source is a fuel cell.

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39. A device for converting electrical voltage from a fuel cell to an AC voltage, comprising:

- a DC bus;
- an inverter coupled to the DC bus, wherein the inverter converts DC voltage from the DC bus to an AC voltage;
- a battery;
- a device coupled to the battery and to the DC bus, wherein the device controls the flow of current to and from the battery; and
- a boost converter coupled to the fuel cell, wherein the boost converter maintains a substantially constant DC voltage on the DC bus by regulating power from the fuel cell, and wherein the boost converter provides a charging current to the battery, and wherein the boost converter protects current from flowing to the fuel cell.

40. The device of claim 39, further comprising an electrical transformer for providing electrical isolation between the fuel cell and the load.

41. The device of claim 39, further comprising an electrical transformer for changing the output voltage of the inverter to another voltage.

42. The device of claim 39, further comprising an electrical transformer for providing a center tap in the output voltage.

43. The device of claim 39, wherein when an increase in load demand occurs, the inverter draws power from the battery via the controller equal to the increased demand until the fuel cell is able to support the increased load demand.

44. The device of claim 39, wherein the inverter is an H-bridge inverter.

45. The device of claim 39, wherein the boost converter regulates power drawn from the battery and the fuel cell during load transients.

46. The device of claim 39, wherein the inverter draws power from the battery when load demands exceed a capacity of the fuel cell.

47. The system of claim 39, wherein the device comprises a controllable semiconductor.

48. The system of claim 39, wherein the device comprises a noncontrollable semiconductor.

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